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THE QUALITY OF TECHNICAL KNOW-HOWS AS LEARNED THROUGH THE ARCHITECTURAL HERITAGE OF THE TAMILS, INDIA

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ABSTRACT

The Scope of this Study revolves mainly around the importance and unique conceptual heritage of Tamil Nadu in the realm of Eco-friendly Architecture. Application of Environmental Engineering and Architectural aspects over the traditional Heritage of Tamil Nadu forms the core of this study. It extends to investigate the salient features of the Eco-friendly Architecture and Environmental Engineering Heritage of the Tamils from the classical to late medieval periods of Tamil Nadu. In this paper, an attempt has been made to focus attention on awareness of Environment as a major determining factor for evolution of the ancient Architectural Heritage in early Tamil Nadu.

Materials and Methods

The present work covers mostly the first three centuries of the Christian era, generally accepted as the age of the Sangam. The Sangam Literature furnishes us quite considerable information. This paper gives explanative way of interpretation. Hence the explorative method is adapted to analyze the data collected. The main sources of the data are taken from the Sangam classical works, Bakthi Literature and Epics, The modern technical concepts of Architecture and Environmental Engineering disciplines and field data also considered

KEYWORDS: Environmental, Architectural, Sangam Classical Works, Bakthi Literature and Epics

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Original Article

INTRODUCTION

Traditional Architecture

Traditional buildings may however be a misleading source of design solutions for present day housing. This is not because of the unpopularity of the traditional or vernacular designs.

The traditional or vernacular house often represented the result of many years or even centuries of optimization in relation to the resources of materials and labor, the activities carried out within and around the dwelling, the social organization of the household, and the climate.

Evolution of Designs

The design of housing are evolved from the landscape in Tamil Nadu.

The planning and the practice of housing with utmost care of the Environment by the ancient Tamil tradition is taken into care for exploring the sustainable quality technical details inherited by the Tamil society.

The reason that we must take care in interpreting the lessons of the traditional house is that the conditions in which and for which it developed, have changed. The activities within the dwelling have changed, the materials

available for building have changed, and the availability of cheap labour during the seasons when it was not required for cultivation may no longer exist. Some example may help to explain this phenomenon.

The material still needs regular maintenance, it has a tendency to crack and fissure, and it has no tensile strength. These disadvantages are not regarded as important in some rural areas, but even there, the material has serious health and structural drawback. It can harbour insects and even vermin, the carriers of dangerous diseases.

In seismic zones the material is highly unsuitable, as mud walls are easily damaged, and can result in high casualty rates when toppled by earthquakes, due to their thickness and density. In urban areas, the sources of mud for building, the borrow pits, occupy valuable building land, and become insect breeding grounds in rainy seasons if they fill with water. It is not surprising that mud-like thatch-is generally regarded as an undesirable material, despite its high thermal capacity, which is a highly desirable property in many climate.

Fortunately the increasing obsolescence of many traditional materials is matched by a growing number of new materials, which in many cases have properties, which are far superior. The strength of reinforced concrete the insulation value of fibre-glass guilt's or expanded polystyrene, the reflectance of aluminium foil, and the waterproof qualities of corrugated metal roofing sheets and synthetic waterproof membrances, are difficult to match with traditional materials. But also have undesirable economic side effects in many developing countries, where imported materials and technology can contribute to balance of payment problems.

There are new materials which can be made locally made from the waste fibers of the sugar refining process; lightweight building blocks incorporating rice husk; machine cut limestone blocks: these are just a few of the possibilities. Hence,

The Quality of Technical Know Hows

The quality of the traditional technical know - hows practiced by the Tamils are made available for proper evaluation of Scientific concepts and appropriate explanations.

It's importance also explored.

The variables of Architectural form adopted by the Tamils are discussed in details with the Environmental Engineering conceptual reasons with due arguments.

Climate and Design

Housing forms by far the most common building type throughout the world. valuable investment is to provide shelter, security and comfortable living conditions for the occupants; and to produce more than 'housing' – to produce homes. These homes will play an important role in social development, providing the environment in which the family can develop. This paper is intended to help the designer achieve good value for the investment devoted to housing, by ensuring that the latter is appropriate for the climate around it, and the activities within it.

Housing presents special problems for design in relation to climate, as the building and the spaces around it accommodate a wide variety of uses over each 24-hour period. In the past, most designers were familiar with the climate in which they were building, having experienced its rhythms and variations since birth. They were also well aware of the ways they could benefit from its advantages, and overcome as far as possible its disadvantages with the limited resources at their disposal. The basic materials and design solutions changed little and when they did they changed slowly. The

traditional or vernacular house often represented the result of many years or even centuries of optimization in relation to the resources of materials and labour, the activities carried out within and around the dwelling, the social organization of the household, and the climate.

Social Conditions: Towns and Town Life

Life in towns was one of luxury and ease. Some of the amusements of the people were dumb-shows and dancing accompanied by music, both vocal and instrumental. Women freely participated in such amenities of life. They attended temples and took part in the public dances. They decked themselves with costly attire and ornaments and made themselves attractive. Their clothes were of cotton, wool, silk, and even rat's hair. One mode of their decoration was the painting of their bodies with scented pastes and powders and the wearing of garlands of flowers.

Village and Village Life

If the town life was rich, the village life was equally so. The villagers of whom the agriculturists, cowherds and shepherds formed the majority, led and simple life attending to their hereditary professions of cultivation and cattle-tending. The villages were not altogether cut off from the activities of town life. There were means of transport which were, primarily, bullock-carts on land and boats on water. Between the villages, or more properly between two great towns, thick forests abounded with wild animals and serpents, streams and springs of water, fruit trees and trees of other kinds, cornfields and flower gardens. Ianko-Atigal gives us a vivid picture of all this when describing the route from ancient Pukar to Madurai.*

The monotonous life of the villager was often enlivened by rural amusements of a varied character. Every village had a common dancing-hall (kalam).

Even the village women took part in these public performances like the tunankai, a kind of dance. Having enough to eat and drink, the villages led a contented and happy life. Notwithstanding the security and peace afforded by the kings of the land, theft was not uncommon. The Maravar who lived in forests and desert tracts, otherwise known as the Eiynar, who were often employed as soldiers in wars by the Tamil kings, had for their chief profession highway robbery. They often deprived the unway wayfarer of his belongings: cattle lifting was one feature of their thieving.

(C.Govindarajan, Kannakiyar adi chuvattil (Pukar Muthal Vanji Varai), Madurai Kamaraj University Publication.)

They were addicted to liquor and ate from a common table. They hunted the wild hog, boar and deer, whose flesh they ate, using their skins as clothes and their ivory teeth and nails as ornaments.

Environment, Renewable Energy and Appropriate Technology

Environment

For a of our subject with a modern and present one,if Auroville is to become "the city the earth needs" One thing it needs to demonstrate is that it cares for its environment and for the larger bioregion. Also that its activities are Ecologically-sustainable rather than exploitative. In fact, since 1968, Auroville's many-faceted Environmental work has had a significant impact both on land owned by Auroville and on the surrounding region which was the core practice of the ancient Tamils.

Afforestation

In 1968, the year of Auroville's inauguration, much of the land in the Auroville area was eroded and minimally productive. Since then an integrated soil and water conservation programme, and the planting of over 2 million trees, has trasformed the landscape and created the substantial beginnings of a 'Green Belt', an afforested zone which will eventually surround the city area. Over recent years there has been a new emphasis upon recreating the indigenous Tropical Dry Evergreen Forest which formerly covered much of the region. To support this project the Auroville Herbarium at Shakti and the Pitchandikulam Bio-Resource Centre have collected many specimens of indigenous trees, shrubs and creepers, and a Botanical Garden is also being developed for both research and demonstration purposes.

The Pitchandikulam Bio-Resource Centre and Shaki Herbarium are also involved with revitalising traditional medicinal plant knowledge, and developing a shared forest management plan for the local indigenous forest under a project funded by the European Union. On another front, Palmyra Centre of Ecological Land Use and Rural Development coordinates integrated land and water management programs for the regeneration of degraded and marginal land in the surrounding bioregion, as well as improving education and health facilities in the villages it works with. it is also involved in an ambitious project to rehabilitate the ancient system of 'eriys' or irrigation tanks as part of a comprehensive water management strategy for the larger region

Ecological Agriculture

Form the beginning, Auroville has practiced organic farming, to heal and nourish the often depleted earth of Auroville. As of today, Auroville's farms comprise approximately 400 acres of cultivated land, managed by some 35 Auroville residents. The dozen or more farms employ around 200 full-time workers from the surrounding villages. The farms vary in their activities. All of them work with a combination of fruit trees, field crops, vegetable gardening and animal husbandry. Some of the farms do their own food processing. Each farmer produces according to his or her area of interest and ability, each taking into consideration the quality and type of soil, water availability and investment potential. They coordinate their production so as to meet the requirements of the community for locally-grown organic produce.

At present, the major sources of organic produce are: Annapurna (rice and grains), Auogreen (fruit and daily), Auro-Orchard (fruit, vegetables, dairy) and Discipline (fruit and vegetables). Smaller organic farms exist at Discipline, AuroAnnam, Ayarpadi, Djaima, Kottakarai, Service Farm, Siddhartha Farm, Solitude, and Windarra. The planning and funding of the Auroville farms is coordinated by the Auroville Farm Group, which has an office at the Solar Kitchen. Some of the organic products are sold in season from the Pour Tous stall and from H.E.R.S. (Health Education Research Service) at Kottakarai. Products are also taken by the Solar Kitchen, by the Auroville Food Processing unit at Bharat Nivas and by the Kottakarai Organic Food Processing Unit at Kottaikarai. The food processing units produce a range of jams, syrus, pickles and chutneys for sale in Auroville and outside.

All these concepts are derived otherwise arrived from our ancient Tamil traditional practices of life amidst the Environment.

Renewable Energy

The use of fossil fuels has not only depleted natural resources but has also greatly polluted the atmosphere, contributing to global warming and climate change. Auroville, in an attempt to be self-sufficient in its energy needs and to cause minimal atmospheric pollution, has a policy of experimenting with and implementing renewable and non-polluting

energy and appropriate building technologies.

Today, Auroville represents the biggest concentration of alternative and appropriate energy systems in India. The major forms of renewable energy utilized in Auroville are solar, wind and biogas.

Solar Energy

Solar energy was first introduced in Auroville in the 1970s and is now widely used throughout the community, primarily for electricity generation and water heating, though it is also used for cooking and drying food. At present there is around 250 kw of electricity-generating solar photovoltaic (PV) panels installed in Auroville, as well as an estimated 150 solar water heating collectors.

Almost 150 houses run entirely on electricity generated by solar PV panels. The power of the sun is used for home lighting. to run fans and refrigerators, as well as for water pumping. There are many more households which use solar PV as a back-up to electricity provided by the conventional grid.

In September 1997 Auroville commissioned a solar PV power plant to provide electricity for Matrimandir. The power plant consists of 484 PV modules with a total capacity of 36.3km, producing approximately 140 kHz of energy a day. This system is one of the largest of its kind in South-India and serves as a demonstration model of decentralized power generation.

Another project which is a pioneering model in solar power technology is the "Solar Bowl" at Auroville's Solar Kitchen. It is a solar concentrator using a fixed spherical bowl with a 15m diameter, generating steam which will eventually be used to prepare up to 2,000 meals per day.

Auroville has 4 units which are actively working in solar energy:

- Auroville Renewable Energy (AuroRE): established in 1993 and specialising in large-scale implementation of solar PV projects inside auroville as well as in the rest of India. It has a particular expertise in solar water-pumping systems.
- Auroville Energy Products (AEP): manufactures or distributes a wide range of products based on renewable energy systems.
- Auroville Solar Service: solar panel and battery maintenance; repair and maintenance of DC systems.
- Altecs: makes uninterrupted power supply systems, solar charge controllers and inverters.

Wind Energy

Windmills for pumping water have been designed and built in Auroville for nearly thirty years. At present, there are over thirty in operation in the community According to a study initiated by the Dutch Government, the aV 55 windmill, which is designed and manufactured by the Auroville workshop Aureka, is three times more efficient than other water-pumping windmills in India. It has been installed in many other places in South India.

CSR has hosted a workshop for wind-pumping organisations in South Asia and plans to run windmill workshops for windmill manufacturers in India to demonstrate and disseminate new ideas.

Generating electric power through wind in Auroville is difficult as the area does not get sufficiently high winds on

any regular basis. However, Auroville wind Systems (AWS) specializes in power generation from renewable energy sources, and has installed wind-hybrid systems (wind in combination with solar power or diesel generators) in many states in India. including Tamil Nadu, Gujarat and Sikkim. It also designed and installed a 500kw wind farm on Sagar Island in the Ganges Delta in West Bengal.

Energy from Biomass and Oil Seeds

Biogas plants for cooking have been in use in India for some years. Biogas is gas-mainly methane – which is given off when cow dung and other forms of biomass ferment under anaerobic conditions. CSR has pioneered research using ferro-cement as a building material for biogas systems since 1987. At present they manufacture both the "floating drum" and "fixed dome" models, both with research funds granted by the Ministry for Non-Conventional Energy Sources (MNES). CSR's ferro-cement biogas plants are in use in many parts of India as well as in Auroville. CSR has also improved on the local design of the biomass stove or "chula", responding to the needs of local villagers by providing them with cheap, fuel effect cooking devices.

Auroville is also undertaking research in finding plants which can act as a substitute for fossil fuels. A team at the Research Farm have already planted over 2,000 pongamia pinnata trees. The seeds from these trees will be processed to obtain an oil which can be used as a substitute for diesel

Appropriate Technology

The term "appropriate technology" refers to processes tools that are appropriate to the climate, socio-economic conditions and natural resources of an area and which contribute to sustainable development. In Auroville, three examples of appropriate technology, in addition to those mentioned above, are earth construction, ferro-cement and wastewater treatment systems.

Earth Construction

Compressed Earth Blocks (CEBs) are made in a manual press (designed and manufactured in Auroville) using a mixture of earth with 3-5% cement. Some of the advantages of using CEBs for construction are that they can be made on site and the manufacture of them doesn't pollute the environment. A CEB uses 3-5times less energy to make than a fired brick. The Visitors Centre, the Solar Kitchen and Pitanga are good examples of their use. In 1996, the Auroville Building Centre designed and built a cyclone-and earthquake-resistant house at the UN Habitat-2 Conference in Instanbul using compressed earth blocks.

Ferro-Cement

Although ferro-cement is not strictly a 'sustainable' technology, as it uses cement and steel, it nevertheless employs them in a highly efficient and cost-effective manner. Ferro-cement in Auroville is used, among other things, in the construction of roof channels, doors, wall modules, water tanks, latrines, slabs and biogas plants. The Auroville Building Centre is at present manufacturing these elements, and running training programmes in ferro-cement techniques for masons and engineers. A video on ferro-cement, "The Most with the least", has been made by CSR with the support of HUDCO, and is used in training programmes all over India.

Environmental Construction

From the early days, some Aurovilians have experimented with using almost exclusively-natural materials and processes for shelter and ventilation. While these are now the exception rather than the norm, they include the use of bamboo frame construction, thatched roofs and mud walls, as well as dampened grass mats and solar chimneys to regulate the internal climate of dwellings.

Water Conservation

Water conservation is an essential component of sustainable environmental practices. Diverse water conservation measures have been adopted by Auroville, including, of course, a massive reforestation programme. Auroville land workers have also built an extensive network of bunds (raised earth embankments) on Auroville and village land to prevent water run-off. Other water conservation measures include the construction of check-dams, particularly in canyons, and plants to make irrigation more efficient.

Recycling Wastewater

More than 25 natural wastewater treatment plants are in use in Auroville. Most recycling systems combine a pre-treatment device, a main treatment planted filter and a post-treatment, usually consisting of one or more ponds or polishing tanks. Research and development has shifted to more efficient pre-treatment systems like the baffled tank reactor, resulting in reducing the size of the costly main treatment plant. The recycled water can be used for irrigation (but not drinking) purposes. At present, CSR participates in a project funded by the European Community, and, in collaboration with German and Indian organizations, in the dissemination of decentralized wastewater treatment systems.

Solar Desalination

Research is being conducted by Manfred, an Auroville environmentalist, on a design for a solar desalination plant to distill sea water by evaporation and render it suitable for irrigation and domestic purposes.

Tackling salt Water Intrusion

Large areas on the Tamil Nadu coast have already been rendered infertile due to salt water intrusion. In 1994, a detailed study was mode by the Auroville Green work Resource, Centre of affected villages in the Tirunelveli District. Subsequently, the findings were documented in an educational video produced in Auroville in Tamil. The video was shown extensively to farmers in the Auroville area and workshops were conducted to explain the causes of salt water intrusion.

Typical Vernacular Elements

The typical vernacular elements found in the dwellings of the two regions have been discussed under two categories. They are (1) elements facilitating ventilation and (2) elements protecting the dwelling from solar radiation. Both categories of elements contribute towards conservation of energy by reducing the need for the use of mechanical devices to achieve thermal comfort.

- **Elements Facilitating Ventilation**

The typical roof forms of dwellings in the two regions. We find openings in the roofs at gable ends, ridges and gables facilitate the removal of hot air from the enclosed spaces by stack effect. The openings at the eaves ventilate the attic space. The cool air in the attic space insulates the space below from the solar heat.

Source

CBRI (1969) "Climatological and dwellings. The timber lattice work replaces the external walls to permit maximum ventilation / air movement. These lattice works not only allow free passage of air but also screen the interior spaces from sky glare. The roof overhang protects the sky glare. The roof overhang protects the lattice work/opening from driving rains and offers shade from direct radiation and glare.

- **Elements which offer Protection from Solar Radiation**

The roof is the dominant element in these vernacular dwellings and acts as a large umbrella. It insulates the living spaces below from the heat of the sun. The walls of the dwellings are low and hence it is easier to protect them from sun. Low wide overhang of eaves protects the walls from sun glare and reduces incident radiation.

CONCLUSIONS

Roof forms, roof overhang, Openings in the roofs, lattice work and low walls together have contributed in a substantial way towards achieving thermal comfort in the interior spaces of dwellings in Kerala State and south kanara district of Karnataka State. Thus, these vernacular elements have been a partial aid to conservation of energy in hot/warm humid zone. Considering the prevailing economic condition in India and the need for providing adequate housing facilities to the economically weaker sections, these vernacular elements may be made use of in the dwellings to be constructed in future, as partial aid to conservation of energy. However, these elements need modification in the light of the present level of construction technology and the advancement in material science.

The Nature of the Physical World

Tamilnadu of Tolkappiam period is aware of these facts that the physical world of nature is made of the five basic universal elements. Nature judges the acts and distributes the results. Hence they adopted all the above modern technical knowhows with all possible humble submissions and lead a simple,hygienic,comfortable happy life. Their understanding with the environment towards their contented life is really worthy to study.

If there is no space and time there will be no history. So it is very important. Tholkappiyar calls it as mutal porul (first matter or initial matter).Karup porul means characteristic regional features of the five tracts, i.e. ecology-environmental matters which help the universe for improvement such as flora and fauna and such other things.

God, food, animals, trees, birds, drums, occupation, and lute and such of these will be called as beings and things of the concerned tract

Urip porul deals about the actions in the five lands.

The land is divided into five as Kurinji, Mullai, Marutam, Neytal, and Palai. This is a universal division. Every country is having hilly tract, forest tract, agriculture tract, maritime tract, and desert tract. Tholkappiyar mentions naturvu nilait tinai for Palai

Marapuiyal –Traditional Conventions

Marapu means rule, law, established usage, that which is sanctioned by custom, use of language sanctioned by ancient authors, antiquity, ancestral line, lineage, Nature, property, characteristic, good conduct, name, fame, greatness, ideal, justice, reverence, civility, etc.

Iyal means nature, property, quality, delicacy, softness, good conduct, literary tamil, treatises, section of a work, containing chapters treating of a series of subject or things in order.

Tolkappiyar deals about the origin of the world. The universe is made of earth, fire, water, air, and the sky, the words are to be formed in accordance with the usage of the human, and non-human class and with the five genders.

He clarifies the differences between living beings from one sense to six senses.

One sense life is that which has the sense of touch.

Two senses life is that which touch, and tongue.

Three senses life is that which have touch, tongue, and nose.

Four senses life is that which have touch, tongue, nose, and eyes.

Five sense life is that which have touch, tongue, nose, eyes, and ear.

Six senses life is that which have touch, tongue, nose, eyes, ear and mind.

The five senses may be compared with the five elements, which have created the world.

Nilam-earth –body-touch, Niir-water-mouth-tougue, Vali-air-nose, Fire –thi-eyes, Visumbu-ear.

He vividly explains the living beings from one sense to six senses with example. **Distinctions of sense organisms**

The well-versed ancient tamil scholars classified the living creatures in this way.

One Sense Beings

The grass and the tree are the one sense beings.

Other types of this species also belongs to this category.

Three Sense Beings

The termite and ant are three sense beings.

Other types of this species also belongs to this category.

Four Sense Beings

The bee and the dragon fly are four sense beings.

Other types of this species also belongs to this category.

Five Sense Beings

The animals and the low class people are five sense beings. And other types of this species also belongs to this category.

Six Sense Beings

The humans are six sense beings.

Others endowed with six senses also belong to this category.

Tholkappiar speaks about the names of the off springs of animals, names denoting male animals and birds names denoting female animals and birds.

All the male species are denoted as aan, all the female species are denoted as pen the identities can be sen thereon.

In English, we call male elephant, female elephant to have identity. In Tamil, the world 'kaliru' denotes male elephant. The word 'piti' denotes the female elephant. Such as, there are separate words for male and female in animals and birds.

There are traditional conventions, for instance, the leaves of all tree and plants are called 'ilai' in Tamil, but for coconut and palm trees, the leaves are called 'oolai'. This is a traditional convention, which we are following even today.

He differentiates the plants of external toughness of structure belong to grass species, and internal toughness of structure are called tree family.

The usages are from the learned, as the occurrence works, secondary works or adoptions.

He mentions about translation also i.e.the secondary works are of four kinds, 1.abridged (comprised), 2.expanded (elaborated), 3.comprised and elaborated, 4.translated in the proper way.

He spelt out about the ten defects in literary composition as well the thirtytwo literary techniques.

Names of Young Ones (Off-Springs)

The tradition which is unalterable, gives the following nine names for young ones (i.e.) paarppu, paral, kutti, kurulai, kanru, pillai, makavu, mari, and kulavi.

Names denoting male animals and birds

- eeru,
- eerrai
- oruttal,
- kaliru
- cee,
- ceeval,
- iralai,
- kalai.
- moottai,
- takar
- utal,
- appar
- poottu,

- kanti
- katuvan, and such other names denote male animals and birds.

Names Denoting Female Animals

- peetai,
- petai
- pettai,
- pen,
- muutu,
- naaku,
- katamai,
- alaku,
- manti,
- paati
- pinai,
- pinavu, and such other names denote the female.

The Words Paarppu and Pillai

Among them,

The words ‘paarppu’ and ‘pillai’ denotes young ones of birds.

The crawling creatures also will have the same paarppu and pillai, for their young ones.

The Word ‘Kutti’

The 1.mangoose, 2.wild cat, 3.rat, and 4.three striped, squirrel will have the name ‘kutti’ for their young ones.

The World ‘Paral’

The word ‘paral’ also will be used in the place of the ‘kutti’ for the above mentioned four animals.

The Word ‘kurulai’

The word ‘kurulai’ will denote the four young ones of 1.dog, 2.pig, 3.tiger. and 4.hare.

The Word ‘Kurulai’

The word ‘kurulai’ can be used for the fox young one also.

The Words ‘Kutti’ and ‘Paral’

The words ‘pillai’ can also be used for the above mentioned five animals young ones

The Word 'Pillai'

The word 'pillai' can also be used for the above mentioned five animals young ones (paral, kurulai) except dog young one.

The Word 'Mari'

The word 'mari' will be used for calling the young ones of sheep, horse, and the deer kinds of navvi and ulai.

The Word 'Kutti'

The monkey young one which lives on the trees will be called as 'kutti'.

The Words 'Makavu', 'Pillai', Paral' 'Paarppu'

The words 'makavu', 'pillai', 'paral', paarppu' all these four words can be used to be called the young one of monkey.

The Word 'Kanru'

The word 'kanru' is used for calling the young ones of five (i.e.) elephant, horse, donkey, the deer kind katamai and the cow.

The Word 'Kanru'

The word 'kanru' is used for denoting the young ones of buffalo and wild cow or a deer kind.

The Word 'Kanru'

The word 'kanru' will denote the young ones of deer kind kavari maan and bear also.

Karaakam-bear.

The Word 'Kanru'

The word 'kanru' will denote the young one of camel also.

The Word 'Kulavi'

The word 'kulavi'denotes the young ones of elephant.

The Word 'Kulavi'

The word 'kulavi' also denote the young ones of cow and buffalo.

The Word 'Kulavi'

The word 'kulavi' also used for the young ones of the deer kinds 'katamai' and marai'.

The Word 'Kulavi'

The word 'kulavi' is used to denote the young ones of monkey kinds mucu, uukam, and the monkey.

The Words 'Kulavi' and 'Makavu'

The words 'kulavi' and 'makavu' only will denote the young ones of human.

The Words 'Pillai' 'Kulavi' 'Kanru' and Poottu

The words 'pillai', 'kulavi', and 'poottu' will denote the one sense faculty.

The Words 'Pillai' 'Kulavi' 'Kanru', and 'Poottu'

The above-mentioned four names will not denote the one sense faculty (ie) paddy and grass.

There are no names other than those mentional above for denoting the young ones.

Masculine Names-'Kaliru'

The male elephant is called 'kaliru'.

'Kaliru'

The male pig also may be called as 'kaliru'

'oruttal'

The male animals of deer, tiger, deer kind fawn, deer king yak, deer kind yac, and alligator are called 'oruttal'.

'oruttal'

The long-tusked male elephant and the pig also may be called as 'oruttal'.

'oruttal'

The male buffalo also may be called as 'oruttal'.

'eeru' - 1

The male buffalo, wild cow, and the cow also may be called as 'eeru'.

'eeru' - 2

The male shark living in the sea also may be called as 'eeru'.

'poottu'- 1

Male animals of the cow, buffalo, tiger, wild cow, deer will be called as 'poottu'.

'poottu'- 2

Thw water living male animals such as crocodile, shark,, trichiurus leptururs, ophicephalus striatus, and

'poottu' -3

The male peacock and the bird elaal will be called as 'poottu'.

'iralai' 'kalai'

The male deer is named as iralai' and 'kalai'

'kalai'

The word 'kalai' wil be used for the male deer kind fawn.

'Moottai', 'Takar', 'Utal', 'Appar'

The words 'moottai', 'takar', 'utal', 'appar' named for the male sheep.

'Ceeval'

All the male birds except peacock will be called as 'ceeval'.

'Eerrai'

The say all the strong male animals may be called as 'eerrai'.

CONCLUSIONS

All the male species are denoted as aan,

All the female species are denoted as pen,

The identities can be seen thereon.

Feminine Names-Piti

The female elephant will be called as piti.

'Pettai' -1

The female camel, horse, donkey, and wild cow will be named as 'pettai'.

'Pettai' - 2

All the female birds also may be called as 'peetai' 'petai'.

'Alaku' 1

The word 'alaku' will denote the female birds the hen and the 'owl'. It will not denote for other birds

'Alaku' - 2

The word 'alaku' will denote the female birds the hen and the 'owl'. It will not denote for other birds.

'Alaku' -3

The female peacock also may be called as 'alaku'.

'Pinai'

The word 'pinai' denotes the female animals of deer, fawn, yac, etc.

'Pinaivu'

The word 'pinaivu' denotes the three female animals of pig, deer, etc.

'Pinaival'

The word 'pinaival' denotes the above mentioned three female animals

'aa'

The word 'aa' denotes the female animals of cow, buffalo, and the wild cow.

'pen' 'Pinna'

The words 'pen' and 'pinaa' denotes the human feminine.

'Naaku' - 1

The word 'naaku' will denote the female animals of buffalo, wild cow, and cow.

'Naaku' - 2

The word 'naaku' will denote the female of the water living snail.

'Muutu' 'Katamai'

The word 'muutu' 'katamai' will denote the female sheep only.

'Paatti' - 1

The word 'paatti' will denote the female of pig and dog

'Paatti' = 2

The word 'paatti' will denote the female of fox also.

'Manti'

The word 'manti' will denotes the female of monkey kinds.

Few Usages

The male monkey is called katuvan,

The owl resident on trees is called koottaan,

The red-mouthed parrot is called tattai,

The fierce looking wild cat is called puucai,

The male horse is called ceeval,

The male horse is called ceeval,

The dark-coloured pig is called kanti,

The male of the buffalo is called kanti,

These are the usages available in the society,

Cannot be overlooked by intelligent people.

Plants

They say, external toughness of structure belong to grass species; internal toughness of structure are called tree family.

Grass species

The limbs of the grass species are sheath, tagged stem (palm), leaf, strip, of leaf, petal, spathe, rib of the leaf, cluster of fruits said the scholars.

Tree Family

They say the limbs of tree family are

- leaf,
- tender, leaf,
- sprout,
- sheath,
- bough,
- shoot,
- flower
- bud
- inner bud and such of these.

For Both of Them

The limbs common to both species are 1.unripe fruit, 2.fruit, 3.inner rind, 4.bark and aerial root.

The Origin of the Universe-the Language Convention

The universe is made of earth, fire, water, air, and the sky. The words are to be formed in accordance with the usage of human, and non-human class and with the five genders which are discussed already.

Convention

Any industry emits smoke and thermal radiation was kept away from the human settlement especially to a remote place.

The waste waters building construction was properly expelled from the site in a hygienic way by the ancient Tamils can be noted from the verses of Madurai Kanji.

The close observation of nature by the ancient Tamils even in the collection of Honey from a special flora of Kurinji landscape namely black stropilanthus Kunthiyanus by the bees can be inferred from the following verses.

கருங்கோற் குறிஞ்சிப் பூக்கொண்டு
பெருந்தே னிழைக்கும்... **- (குறுந்தொகை 3:3- 4)**
பிரசந் தூங்கு மலை **- (குறுந்தொகை 392:8)**
தேன்தூங்கு உயர்சிமைய
மலை. **- (மதுரைக்காஞ்சி 3)**

பெரும்பயன் தொகுத்த தேங்கொள் கொள்ளை - (மலைபடுகடாம் 317)

Sweet edible roots of a special flora namely kavalai was consumed by the people which points out the direct consumer activity can be found from the following verses.

கவலை கெண்டிய அகல்வாய்ச் சிறுகுழி - (குறுந்தொகை 233:1)

ஆழ்ந்த குழும்பிற் றிருமணி கிளர - (மதுரைக்காஞ்சி 273)

Thinai a special crop for the hilly tract was developed in full fledged condition with great yield in a natural way and the flora of different kinds were also keeping the pollution free Environment. More over a clear space and earth with hygienic Environment was kept and used by the ancient Tamils even at their habitual centers are referred here unde

நெற்கொள் நெடுவெதிற்கு அணந்தயானை
முத்துஆர் மருப்பின் இறங்கு கைகடுப்ப
துய்த்தலை வாங்கிய புனிறுதீர் பெருங்குரல்
நல்கோட் சிறுதிணைப் படுபுள் ஓம்பி - (குறுந்தொகை105:35- 38)

Likewise the processing of paddy crop in the delta is also developed and consumed in a hygienic way. with the technical knowhows,the paddy grains were preserved in massive granaries by scientific ways and means can be identified from the following verses.

களிறுமாய்க்குங் கதிர்க் கழனி - (மதுரைக்காஞ்சி 247)
ஞெண்டாடும் செறுவிற் றராய்க்கண் வைத்த
வீலங்க லன்ன போர்முதற் றொலைஇ
வளஞ்செய் வினைஞர் வல்சிநல்க - (மலைபடுகடாம் 460-462)
பைதற விளைந்த பெருஞ்செந் நெல்லின்
தூம்புடைத் திரள்தாள் துமித்த வினைஞர் - (பெரும்பாணாற்றுப்படை 230-231)
பலிபெறு வியன்கள மலிய வேற்றி
கணங்கொள் சுற்றமொடு கைபுணர்ந்தா டும்
துணங்கை யம்பூதங் துகிலுடுத் தவை போல்
குடக்காற்றெ றிந்த குப்பை வடபால்
செம்பொன் மலையிற் சிறப்பத் தோன்றும்
கொழுமீன் குறைய ஒதுங்கி வண்இதழ்க்
கழுநீர் மேய்ந்த கடவாய் எருமை
பைங்கறி நிவந்த பலவின் நீழல்
மஞ்சள் மெல்இலை மயிர்ப்புறம் தைவர
விளையா இளங்கள் நாறமெல்குபுபெயராக்
குளவிப் பள்ளிப் பாயல் கொள்ளும். - (சிறுபாணாற்றுப்படை 41-50)

பைந்தாது எருவின் வைகுதுயில் மடியும் - (நற்றிணை 27 : 2)

தொடிப்புழுதி கஃசா உணக்கின் பிடித்தெருவும்

வேண்டாது சாலப் படும். - (குறள்.1037)

ஏரினும் நன்றால் எருஇடுதல் இட்டபின் - (குறள்.1038)

நீரினும் நன்றதன் காப்பு.

பேர்உறைதலையே வெற்றும்புலர்வைகறை

ஏர் இடம் படுத்த இருமறுப்பூமிப்

புறம்மாறு பெற்ற பூவல் ஈரத்து

ஊண் கிழித்தன்ன செஞ்சுவல் நெடுஞ்சுவல்

வித்திய மருங்கின் விதைபல நாறி -அகநானூறு 194:1- 5

தளிபதம் பெற்ற கான் உழுகுறவர்

சிலவித் தகல இட்டென பல விளைந்து - (நற்றிணை 209: 2- 3)

அரிகால்மாறிய அங்கண் ணகல்வயல்

மறுகால் உழுத ஈரச் செறுவின்

வித்தொடு சென்ற வட்டிபற் பல - (நற்றிணை 210: 1- 3)

சிறுதினை கொய்த இருவி வெண்கால்

காய்த்த அவரை..... - (ஐங்குறுனூறு 286: 1- 2)

முதைபடு பசுங்காட்டு அரில்பவர் மயக்கி

பகடுபடு பூண்ட உழவுறு செஞ்செய்

இடுமுறை நிரம்பி ஆகுவினைக்கலித்து

பாசிலை அமன்ற பயறுஆபுக் கென - (அகநானூறு 262: 1- 4)

All these above references points out the tilling, sewing, watering, weeding etc., by the peasants in a pollution free way of technical labour.

The paddy fields were called 'sey', because it was manmade. By little interaction of the man with the forest the cultivable lands were created in Tamilnadu. Therefore they treated these lands as mother like.

'மையல் மாமேனி நிலம் என்னும் நல்லவள்' (களவழி நாற்பது)

'நிலமென்னும் நல்லாள்' -(திருக்குறள்)

The burial custom adopted by the ancient Tamils were pollution free practice.One can explain the hygiene practiced by them as follows.

"கலம் செய்கோவே! கலம் செய்கோவே!

நெடுமாவளவன்

தேவர் உலகம் எய்தினன் ஆதலின்

அன்னோற் கவிக்கும் கண் அகன்தாழி

வனைதல் வேட்டனை ஆயின்.... ” - (புறநானூறு 228)

“கலம் செய்கோவே! கலம் செய்கோவே!

சுரம் பல வந்த எமக்கும் அருளி

வியல் மலர் அகன்பொழில் ஈமத்தாழி

அகலிதாக வனைமோ

நனந்தலை மூதூர்க் கலம்செய்கோவே! ” - (புறநானூறு 256)

The importance of the water was thoroughly understood and taken care of by the ancient Tamils which were recorded as follows.

“நிலத்தினும் பெரிதே வானினும் உயர்ந்தன்று - (குறுந்தொகை 3:1-2)

நீரினும் ஆரளவின்றே”

“நிறைகடல் முகந்துராய் நிறைந்து நீர்தளும்புமம்தன்

பொறை தவிர்பு அசை” - (பரிபாடல் 6:1-2)

“கடல்முகந்து கொண்ட கமஞ்சூல் மாமழை

சுடர்நிமிர் மின்னொடு வலன் ஏர்பு” - (அகநானூறு 43:1- 2)

“நிறைஇரும்பௌவம் குறைபடமுகந்துகொண்டு

அகலிரு வானத்து வீசுவளி

முரசு அதிர்ந்தன்ன

மின் மயங்கு கருவிய கல்மிசை பொழிந்தென” - (குறிஞ்சி 235-237)

“கல்குறைபடுத்தநீர் கல்குறைபட எறிந்து” - (பரிபாடல் 20:1)

All shows the pollution free waters of the ancient Tamilnadu. Having such rain waters and other water enhances the water table, its potability and softness.

The rain water harvesting and keeping them in pollution free condition, the security for the hygiene of water bodies was in practice among the Tamils for which we have evidences as follows.

“துறை போகு அறுவைத் தூமடி யன்ன” - (நற்றிணை 70:2)

“மணிகண்டன்ன துணி கயம்” - (அகநானூறு 56:2)

“அறுவைத் தூவிரி கடுப்பத் துவன்றிமீமிசைத்

தண்பல இழிதரும் அருவி” - (புறநானூறு 154:10-12)

“திறள்வேல் நுதியின் பூத்த கேணி” - (சிறுபாணாற்றுப்படை 172)

“வளமனைமகளிர் குளநீர் அயர” - (மதுரைக்காஞ்சி 603)

"துணைபுணர் ஏற்றின் எம்மொடுவந்து

துஞ்சா முழவின் மூதூர் வாயில்

உண்துறை நிறுத்தப் பெயர்ற் தனன்" - (குறிஞ்சி 235-237)

"மாசுபோக புனல் படிந்தும்" - (பட்டினப்பாலை 100)

"துகள் அறத்துணிந்த மணிமருள் தெந்நீர்

குவளை அம் பைஞ்சுனை அசைவுவிடப்பருகி" -(மலைபடுகடாம் 250-251)

"வான் பொய்ப்பி னும் தான் பொய்யா

மலைத்தடைய கடல் காவிரி" - (பட்டினப்பாலை 255)

"நீர்இன்று அமையா யாக்கைக்கு எல்லாம்

உணவு எனப்படுவது நிலத்தோடு நீரே

நிலன் நெளிமருங்கில் நீர்நிலை பெருகத்

தட்டோர் அம்ம, இவண் தட்டோரே;

தள்ளாதோர் இவண் தள்ளாதோரே." - (புறநானூறு 18:18-30)

"பொய்யா வானம்புதுப் பெயல் பொழிந்தென" - (நெடுநல்வாடை 2)

"அற்சிர வெய்ய வெப்பத்தண்ணீர்

சேமச் செப்பில் பெறீ இயரோ நீயே" - (குறுந்தொகை 277:4-5)

"ஆழ அமுக்கி முகக்கினும் ஆழ்கடல்நீர்

நாழி முகவாது நானாழி" - (ஔவையார், மூதுரை, பா.எண்.19)

"மழை கொளக் குறையாது, புனல்புக நிறையாது

முழங்கு திரைப் பனிக்கடல்" -(பதிற்றுப்பத்து 45:19-22)

"கொளக் குறைபடாமையின் முந்நீரனைய" -(பதிற்றுப்பத்து 90:16)

"தைத்திங்கள் தண்கயம் போலக்

கொளக் கொளக் குறைபடாக்கூழடைவியனகர்" - (புறநானூறு 70:6-7)

"மழைக் கொளக் குறையாதுபுனல்புக மிகாது

கரைபொருது இரங்கும் முந்நீர் போல" -(மதுரைக்காஞ்சி 424-425)

"மான்அடி பொறித்த மயங்குஅதர் மருங்கின்

வான்மடி பொழுதில் நீர்நசைஇக் குழித்த

அகழ்சூழ் பயம்பின்" -(பெரும்பாணாற்றுப்படை105-10

"..... நெடுங்கிணற்று

வல் ஊற்று உவரி தோண்டி" - பெரும்பாணாற்றுப்படை118-119

"கோடை நீடினும் குறைபடல் அறியாத்

தோள்தாழ் குளத்த கோடு காத்திருக்கும்

கொடுமுடி வலைஞர்" - பெரும்பாணாற்றுப்படை272-274

"வண்டல் ஆயமொடு உண்துறைத்தலைஇ

புனல் ஆடு மகளிர்" - பெரும்பாணாற்றுப்படை311-312

"அகல்இரு வானத்துக் குறைவில் ஏய்ப்ப

அரக்கு இதழ்க் குவளையொடு நீலம்நாடி

முரட்டூ மலிந்த முதுநீர்ப் பொய்கை - (பெரும்பாணாற்றுப்படை 292-294)

"நறுவீ நாகமும் அகில ஆரமும்

துறையாடு மகளிர்க்குத் தோட்புணையாகிய

பொருபுனல் தரூஉம்" - (பொருநராற்றுப்படை 154-155)

"உறைக் கிணற்றுப் புறச்சேரி" - (பட்டினப்பாலை 51-52)

"நெடுமால் சுருங்கை நெடுவழிப் போந்து" - (நெடுநல்வாடை 95-97)

"கல்லிடித்தியற்றிய இட்டுவாய்க்கிடங்கின் நல்எயில்" - (பரிபாடல் 20:104)

A best system of water management was existed among the Tamils. They have cut, dugged, and built the rivers, canals, brooks, lakes, tanks, ponds, pools, check dams, sluices etc., and the controlled water supply in accordance with the need and the season is remarkable.

"வருந்திக் கொண்ட வல்வாய்க் கொடுஞ்சிறை

மீதில் கொடு நீர் போக்கி" - (புறநானூறு 118:3)

"உண்ணீர் வளம் குளம் கூவல் வழிப்புரை

தண்ணீரே அம்பலம் தான் பாற்கடுத்தான் - பகன்நீர

பாடலோடு ஆடல் பயின்று உயர்செல்வனாய்

கடலொடு ஊடல் உளான் கூர்ந்து" - (அகநானூறு 346:9-10)

"குளம்தொட்டு காவு பதித்து வழிசீத்து

உளம்தொட்டு உழுவயல் ஆக்கிவளம் தொட்டுப்

பாகுபடும் கிணற்றோடு என்றுஇவைபாற் படுத்தான்

ஏகும் சுவர்கம் இனிது" - (ஏலாதி 51)

"தண்கேணித் தகை முற்றத்து

பகட்டு எருத்தின் பலசாலை" - (குறிஞ்சி 236-237)

"கழனி வந்து கால் கோத்தென
பழன வாளை பாளை உண்டென" - (பரிபாடல் 7:33-34)

"வான் பொய்ப்பினும் தான்பொய்ய
மலைத் தலைய கடற்காவிரி
புனல் பரந்து பொன் கொழிக்கும்" -(பட்டினப்பாலை 5-7)

"ஒளிறு மருப்பின் களிறு அவர
காப்பு உடைய கயம் படிலினை" -(புறநானூறு 15:9- 10)

"நல்மரன் நளிய நறுந்தண்சாரல்
கல்மிசை அருவி தண்ணெனப்பருகி" - (புறநானூறு 150:15- 16)

"பாரி பறம்பிற் பனிச் சுனைத்தெண்ணீர்
தைஇத் திங்கள் தண்ணிய தரினும்" - (குறுந்தொகை 196:3-4)

"சுனைகொள் தீம்நீர்ச் சோற்று உலைக்கூட்டும்" - (அகநானூறு 169:7)

"நாள்இரை தரீஇய எழுந்த நீர்நாய்
வாளையொடு உழப்ப துறைகலுழ்ந்தமையின்
காஞ்சி நீழல் கருவை அயரும், " - (அகநானூறு 336:3-9)

"கலம்சிதை இல்லத்துக்காழ்கொண்டு தேற்றக்
கலங்கிய நீர்போல் தெளிந்து நலம் பெற்றாள்" - (கலித்தொகை142:64- 65)

Keeping the Air from Pollution:

Like the waters, The space and the air were also carefully kept away from pollution and the proper ventilation provided in the housing along with the controlled lighting in their dwellings are revealed in the following references.

"மாலை தாமத்து மணிநி நிரைத்து வகுத்த
கோலச் சாளரக் குறுங்கண்" - (சிலம்பு 2:22- 23)

"வானுற நிவந்த மேனிலை மருங்கில்
வேனிற் பள்ளித் தென்வளி தரூஉம்
நேர்வாய்க் கட்டளை" - (நெடுநல்வாடை 60-62)

"விளைவு அறாவியன் கழனி
கார்க் கரும்பின் கமழ் ஆலைத்
தீத்தெறுவின் கவின் வாடி
நீர்ச் செறுவின் நீள்நெய்தல்
பூச்சாம்பும் புலந்து ஆங்கண்" - (பட்டினப்பாலை 8-12)

"..... கூம்பொடு

மீப்பாய் களையாது, மிசைப் பாரம் தோண்டாது

புகாஅர்ப் புகுந்த பெருங்கலம் தகாஅர்" - (புறநானூறு 30:11- 13)

"..... பரிப்புச் சூழ்ந்த மண்டிலமும்

வளிதிரிதரு திசையும்

வறிது நிலைஇய காயமும் என்று இவை

சென்று அளந்து அறிந்தோர் போல.....

இணைத்து என்போரும் உளரே" - (புறநானூறு 30:3- 4)

"நளிகடல் இரும்குட்டத்து

வளி புடைத்த கலம் போல" - (புறநானூறு 26:1- 2)

"நளியிரு முன்னீர் நாவாயோட்டி

வளிதொழிலாண்ட வுரவோன்மருக" - (புறநானூறு 66:1- 2)

"கோட்சுறாக் கிழித்த கொடுமுடி நெடுவலை

தண்கடல் அசைவளி எறிதொறும் வினைவிட்டு

முன்றிலில் தாழைத் தூங்கும்

தெண் கடற்பரப்பு" - (அகநானூறு 340:18- 20)

"நளிஇருமுந்நீர் நாவாய் ஓட்டி

வளிதொழிலாண்ட உரவோன்" - (புறம் கழகம் ப.151)

"..... திண்திமில்

எல்லுத்தொழில் மடுத்த வல்வினைப் பரதவர்

கூர் உளிக் கடுவிசை மாட்டலின் பாய்புஉடன்" - (புறம் கழகம் 340:18- 20)

"நீர்மி கின்சிறையும் இல்லை; தீமிகன்

மண் உயிர் நிழற்றும் நிழலும் இல்லை

வளிமிகின், வலியும் இல்லை." - (புறம் கழகம் 51:1- 3)

"வளி நுழையும் வாய் பொருந்தி" - (பட்டினப்பாலை 152)

"சில்காற்று இசைக்கும் பல்புழை நல்இல்" - (மதுரைக்காஞ்சி 358)

"கோலச் சாளரக் குறுங்கண் நுழைந்து" - (சிலம்பு 15:101)

"குறுந்தொடை நெடும்படிக்கால்

கொடுந்திண்ணை பல்தகைப்பின்

புழைவாயில் போகுஇடை கழி

மழை தோயும் உயர் மாடம்'' - (பட்டினப்பாலை 142-145)

''தென்கடற்திரையின் அசைவளி புடைப்ப

நிரைநிலை மாடத்து அரமியம் தோறும்'' - (மதுரைக்காஞ்சி 450-451)

''பெரும் புலர் விடியலின் விரும்பி'' - ''நற்றிணை 172:4''

''மழைவிளையாடும் கழைவளர் அடிக்கத்து

ணங்குடையாளிதாக்கலின், பல உடன்

கணம்சால் வேழம் கதழ்வுற்றாங்கு,

எந்திரம் சிலைக்கும் துஞ்சாக் கம்பலை

விசயம் அடுஉம் புகைசூழ் ஆலைதொறும்

கரும்பின் தீம்சாறு விரும்பினீர் மிசைமின்'' - (பெரும்பாணாற்றுப்படை 257- 262)

''இடுக ஒன்றோ! சுடுக ஒன்றோ! - (புறநானூறு 236:20- 21)

படுவழிப் படுக''

''.....

கரிபுற விறகின் ஈம ஒள் அழல்

குறுகினும் குறுகுக; குறுகாது சென்று

விசும்புற நீளினும் நீள்க...'' - (புறநானூறு 231:2- 4)

''களரி பரந்து கள்ளி போகி

.....

ஈம விளக்கின் பேஎய் மகளிரொடு

..... இம்மஞ்சுபடு முதுகாடு'' - (புறநானூறு 356:1- 4)

''ழல் சென்ற மருங்கின வெள்ளி ஓடாது

மழை வேண்டுபுலத்து மாரி நிற்ப'' - (பதிற்றுப்பத்து 13:25-26)

''வறிது வடக்கு இறைஞ் சியசீர்சால் வெள்ளி

பயங்கெழு பொழ தொடுஆநியம் நிற்ப'' - (பதிற்றுப்பத்து 24:24-25)

''மைமீன் புகையினும் தூமம் தோன்றினும்

தென்திசை மருங்கின் வெள்ளியோடினும்'' - (புறநானூறு 117:1- 2)

''நின்நாள் திங்கள் அணையஆக! திங்கள்

யாண்டு ஓரணையஆக! யாண்டே

ஊழி அணையஆக! ஊழி

வெள்ள வரம்பின் ஆக'' - (பதிற்றுப்பத்து 90:51-54)

"மடவரல் மகளிர் பிடகைப் பெய்த

செவ்வி யரும்பின் பைங்காற் பித்திகத்து

அவ்வித ழவிழ்பதங் கமழ் பொழுதறிந்து" - (நெடுநல்வாடை 39:41)

"ஒன்னார் செகுப்பினும் செகுக்க என்னதூஉம்

கடிமரம் தடிதல் ஓம்புநின்

நெடுநல் யானைக்குக் கற்றது அற்றாவே" - (புறநானூறு 57:8-10)

CONCLUSIONS

One cannot speak of environment without considering the impact on the lives of people. We have hundreds of small-scale and continuing environmental disasters taking place all around us. But we overlook them so long as they do not impact our lives or our lifestyles.

- Architecture and Environmental Engineering were inseparable or complex formation among the ancient Tamils.
- The experience of the Tamils with the nature or Environment is very rich which yield the modern green house effect to the lively hood of the ancient Tamils.
- According to the experience and inherited knowledge, they have classified the Environment as follows.
- The space filled with different gases around the earth. (Vayu Mandalam)
- Watery surface of the earth. (Neer Mandalam)
- The crest of earth filled with soil, rocks, etc., (Nila Mandalam)
- Different types of life (creatures) living in the above three surfaces (Uyir Mandalam)

These classification of the inherited knowledge prevailed among the ancient Tamil confirms the following Architecture and Environmental Engineering wisdom practiced in ancient Tamil Nadu.

- Analytical knowledge of the earth and making use of system.
- Keeping pollution free earth. Awareness of pollution etc.
- Usage of natural manures for their cultivation and agricultural efforts. Keeping the potential virgin soil.
- Minimized intervention in deforestation for having their Architectural structures.
- Afforest ration in and around housing either by belief or sense of beauty or religious practice.
- Awareness of pollution free water bodies. Having different water bodies for the domestic purposes like bathing, washing, building, drinking, cattle, etc.
- The drinking purpose water bodies were protected by engaging security.
- Awareness of the potable and domestic waters and the minimum usage.
- Knowledge of the pollution free air and usage by keeping away the industries in the outskirts of their residency.

- Awareness of fire and the technical know-hows of its usage.
- The soft approach over the nature -Environment can be very well understand from the inherited behavior of the ancient Tamil people which can be inferred from the following.

All the poems of Natrinai are on love. A recurrent theme in at least 50 per cent of the verses is the reference to trees.

Today, mankind has realized the key role trees play not only as a balm for sore eyes but also in our environment. We have done this with the aid of the most advanced technology.The poets of the Natrinai had no modern technology but had not only connected the role of trees to their well-being,but had observed even the minute variations of trees as the seasons change.